

# MODIS Cloud Microphysics Product (MOD\_PR06OD) Data Collection 6 Updates



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## Introduction

The MODIS Cloud Optical and Microphysical Product (MOD\_PR06OD) for Data Collection 6 has entered full scale production. Aqua reprocessing is almost completed and Terra reprocessing will begin shortly. Unlike previous collections, the CHIMAERA code base allows for simultaneous processing for multiple sensors and the operational CHIMAERA 6.0.76 stream is also available for VIIRS and SEVIRI sensors and for our E-MAS airborne platform.

## Brief Summary of Changes

- Improved multilayer cloud detection algorithm that includes two additional tests and stores values as a true confidence level.
- New forward libraries with expanded ranges of optical thickness and effective radius, based on DISORT with no asymptotic theory. These libraries have improved computational resolution that allow us to capture fine features of the phase functions better than before. Single scattering is now added on the fly during retrieval instead of being a part of library reflectance, thus reducing the complexity needed to capture the forward peak. The new library set also includes Cox-Munk ocean BRDF model and new ice crystal phase functions from UW-Madison. We also provide tables of  $Q_e$ ,  $g$  and  $\omega_0$  values for all clouds as part of collection 6 MOD06 files so users can rescale our output as needed. Interpolation is now done using more reasonable limits based on scattering angle.
- A number of improvements to our handling of ancillary data, such as temporally interpolating model atmospheric profiles, new surface albedo libraries, high resolution cloud top properties data.
- Improvements to our cloud thermodynamic phase algorithm
- Improved clear sky restoral algorithm with color tests to better distinguish between dust and uniform cloud based on FFNET aerosol code courtesy of GMAO and additional  $CO_2$ -based tests.
- Improved retrieval solution logic
- Added pixel-level uncertainty due to emission for  $3.7\mu m$  channel
- Improvements to our  $1.6\mu m$  and  $3.7\mu m$  retrievals, such as decoupling of answers from  $2.1\mu m$  results, iteration on correction for cloud emissivity, improved atmospheric emission correction and better surface temperature data.
- Separated pixels that were identified as possibly partly cloudy into their own set of SDSs, with a `_PCL` identifier
- Added SDSs where we report retrievals from alternate solution logic that failed the standard retrieval method. The Retrieval\_Failure\_Metric SDSs contain optical thickness, cloud effective radius and distance of the failed pixel from the Nakajima-King library space as an uncertainty proxy.

## Sample Results

